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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/252,507	02/18/1999	WOLFGANG HELD	A32188PCTUSA	4587

21003 7590 07/29/2003

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EXAMINER
TRAN, HIEN THI

ART UNIT	PAPER NUMBER
1764	

DATE MAILED: 07/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/252,507	HELD, WOLFGANG	
	Examiner	Art Unit	
	Hien Tran	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 May 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3 and 5-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3, 5-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claims 1, 3, 5-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, line 8, "the underlying area" has no clear antecedent basis.

In claim 3, line 1 "2" should be changed to --1--. See claim 5 likewise.

In claim 7, line 4 one of the periods should be deleted. See claim 17 likewise.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1, 3, 5-11, 15-29, 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katoh et al (5,402,641) in view of Cornelison et al (5,240,682).

With regard to claim 1, Katoh et al discloses an internal combustion engine arrangement comprising an internal combustion engine 2. Presumably this includes both diesel and spark-ignited engines. Katoh et al discloses an exhaust line 4 receiving exhaust gas from the internal combustion engine 2. Katoh et al discloses an oxide gas absorber 6 or 6a in the exhaust line 4, the absorber including a support member having a total surface area that is larger than that of the underlying area of the support member. Katoh et al's monolith of alumina is coated with metals that results in a layer on the alumina having greater surface area than the underlying alumina. Katoh et al discloses an absorption layer on a surface exposed to a flow of gas and capable of reversibly absorbing at least one nitrogen oxide and/or at least one oxide of sulfur (col. 1, lines 60-68).

The instant claim recites a control unit for controlling the temperature of the absorption layer by adjusting the composition parameters of the exhaust gas. This is means plus function language that invokes 35 U.S.C. 112 paragraph 6. The details of the means include supplemental electric heating, ignition control, variation of lambda, addition of secondary air, and heating with a burner (instant specification, page 7, lines 14-19), and injecting fuel into the exhaust as well as inductive heating and exhaust throttling (instant specification, page 10, line 24 to page 11, line 4). Katoh et al discloses means for controlling the temperature of the absorption layer that include changing the air/fuel ratio, changing temperature (col. 2, lines 1-37, col. 4, lines 29-56). Katoh et al discloses a control unit 8 for controlling these processes (col. 5, lines 6+).

Katoh et al discloses essentially the same invention as that of the instant claim but fails expressly to disclose a metal support member.

However, Cornelison et al discloses a metal support member (Abstract) heatable by application of electric current.

Cornelison et al and Katoh et al are analogous art in that both deal with exhaust gas NOx removal.

At the time of the invention it would have been obvious to one skilled in the art to use the support material of Cornelison with the apparatus to Katoh et al.

The motivation would have been to utilize a metal thickness that was thin enough to be light weight and capable of accepting corrugation in a non-nesting pattern, such as herringbone or chevron and capable of over-folding (Cornelison et al, col. 4, lines 16-29).

With regard to claim 3, Cornelison et al discloses a metal support member that is a metal sheet or foil (Cornelison et al, col. 4, lines 16-29).

With regard to claims 5 and 6, Cornelison et al discloses a support member having a wall thickness less than or equal to 0.16 mm in the region provided with the absorption layer (col. 4, lines 26-29). Specifically, Cornelison et al discloses a thickness of 0.0406 mm (0.0016 inches).

The motivation for combining metal support material this thin would have been to utilize a thickness that was thin enough to be light weight and capable of accepting corrugation in a non-nesting pattern, such as herringbone or chevron and capable of over-folding (Cornelison et al, col. 4, lines 16-29). Cornelison et al discloses a metal support member with a wall thickness less than 0.1 mm and 0.05 mm (column 4 lines 16-29). (A thickness of 0.001 inch is equal to 0.0254 mm, which is less than 0.05 mm.)

With regard to claims 7-11, it is well-known in the art, as disclosed by Cornelison et al, to build exhaust treatment devices using a variety of internal shapes and configurations,

including parallel passages with closed cross-section, structures that render the flow turbulent, corrugation, subdivided passages, and features having various lengths, cross sections and numbers of passages.

With regard to claim 15, Katoh et al discloses an absorption layer that contains an aluminum oxide (col. 3, line 61 to col. 4, line 3: alumina is an aluminum oxide).

With regard to claim 16, Cornelison et al discloses an absorption layer containing gamma aluminum oxide (column 1 line 31).

With regard to claims 17 and 18, Katoh et al discloses an absorption layer containing an element selected from the group consisting of alkali metals, alkaline earth metals, rare earths, lanthanum, titanium, copper and manganese, and where the absorption layer contains at least one of the elements barium, sodium and potassium (col. 3, line 61 to col. 4, line 3).

With regard to claim 19, Katoh et al discloses the absorption layer absorbs nitrogen oxides from an exhaust gas with an excess of oxygen during lean operation of the internal combustion engine (col. 1, lines 60-68).

With regard to claim 20, Katoh et al discloses an absorbing layer releasing at least one of NOx and SOx in a reducing atmosphere or at low oxygen concentration (col. 1, lines 60-68: a rich exhaust mixture has a low oxygen concentration).

With regard to claims 21, 24, Katoh et al discloses provision of an oxygen concentration measuring means 16 for controlling oxygen concentration of the exhaust gas (col. 5, lines 6-36).

With regard to claim 22, Katoh et al discloses an absorption layer that releases at least one of NOx and SOx at an elevated temperature (col. 2, lines 14-51).

With regard to claims 23-24, Katoh et al discloses a temperature measuring means 10, 10A and control means 8 for receiving the temperature signal and controlling charging or discharging of the gas absorption layer.

With regard to claim 25 and 26, Cornelison et al discloses a support member made of a ceramic material (column 1 line 23) and of a metal foil (Abstract). The thickness of the absorption layer is a result-effective variable. It would have been obvious to one skilled in the art to experimentally determine the thickness that is thick enough to hold a sufficient amount of oxide gas without being so thick as to require unacceptably long purge times.

With regard to claims 27-28, Katoh et al discloses an absorption layer including alumina wash coat and precious metal (col. 3, lines 63-66).

With regard to claim 27, Cornelison et al discloses an absorption layer applied as a wash coat (col. 1, line 30).

With regard to claim 29, Katoh et al discloses an absorption layer including an oxidation catalyst (col. 3, lines 63-66; for example, Pt is an oxidation catalyst) containing the precious metal.

With regard to claims 31-32, Katoh et al discloses an oxidation catalyst comprising a three way catalyst 6B separate from the absorber 6A (col. 4, lines 4-13).

5. Claims 12-14, 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katoh et al (5,402,641) in view of Cornelison et al (5,240,682) as applied to claims 1, 3, 5-11, 15-29, 31-32 above and further in view of Neal et al (4,755,499).

With regard to claims 12-14, Katoh et al discloses essentially the same invention as the instant claims but fails expressly to disclose an absorption surface with an area of at least 20 M^2.

However, Neal et al discloses an alumina substrate with a surface area above 100 square meters per gram (col. 5, line 30). This is above the lower limits presented in claims 12-14.

Neal et al and Katoh et al are analogous art in that both deal with removing nitrogen oxides and sulfur oxides from gas streams.

At the time of the invention it would have been obvious to one skilled in the art to use material with a high absorption surface like that of Neal et al in the apparatus of Katoh et al.

The motivation would have been to use sorbents that are outstandingly effective for the removal of nitrogen oxides and sulfur oxides from waste gas streams (Neal et al Abstract).

With regard to claim 30, Neal et al discloses an absorption layer with a pore volume of at least 0.2 cubic centimeters per gram of mass (col. 6, lines 1-4).

6. Claims 1, 3, 5-11, 15-29 and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Araki et al (5,404,719) in view of Katoh et al (5,402,641) and Cornelison et al (5,240,682).

With regard to claim 1, Araki discloses an internal combustion engine arrangement comprising an internal combustion engine. Presumably this includes both diesel and spark-ignited engines. Araki discloses an exhaust line receiving exhaust gas from the internal combustion engine 6. Araki discloses an oxide gas absorber in the exhaust line (col.1, lines 41-43) including a support member having a total surface area that is larger than that of the underlying area of the support member. Araki's monolith of alumina is coated with metals that results in a layer on the alumina having greater surface area than the underlying alumina. Araki discloses an absorption layer on a surface exposed to a flow of gas and capable of reversibly absorbing at least one nitrogen oxide and/or at least one oxide of sulfur (col. 1, lines 41-43).

The instant claim recites a control unit means for controlling the temperature of the absorption layer by adjusting the composition parameters of the exhaust gas. This is means plus function language that invokes 35 U.S.C. 112 paragraph 6. The details of the means include supplemental electric heating, ignition control, variation of lambda, addition of secondary air, and heating with a burner (instant specification, page 7, lines 14-19), and injecting fuel into the exhaust as well as inductive heating and exhaust throttling (instant specification, page 10, line 24 to page 11, line 4). Araki discloses means for controlling the temperature of the absorption layer that include electric heating (col. 5, line 55), injecting fuel into the system and injecting air into the system (Araki claim 1). Araki discloses a control unit for controlling these processes (ECU col. 2, lines 18-26).

Araki is silent as to whether the control means is used during regeneration. However, Katoh et al discloses the conventionality of providing a control unit 8 for controlling regeneration of the absorber which is the same as that of the instant claim.

It would have been obvious to one having ordinary skill in the art to control the absorber in the manner taught by Katoh et al in the apparatus of Araki as controlling the composition parameters and temperature thereof is known in the art as evidenced by Katoh et al, and no cause for patentability here.

With respect to the claimed metal support member, the same comments with respect to Cornelison et al apply.

With regard to claim 15, Araki discloses an absorption layer that contains an aluminum oxide (col. 2, line 39: alumina is an aluminum oxide).

With regard to claims 17 and 18, Araki discloses an absorption layer containing an element selected from the group consisting of alkali metals, alkaline earth metals, rare earths, lanthanum, titanium, copper and manganese, and where the absorption layer contains at least one of the elements barium, sodium and potassium (col. 2, lines 38-45).

With regard to claim 19, absorption from a exhaust gas with an excess of oxygen during lean operation of the internal combustion engine is an intended use and does not patentably distinguish the claim from the prior art.

With regard to claim 20, Araki discloses an absorbing layer releasing at least one of NOx and SOx in a reducing atmosphere or at low oxygen concentration (col. 1, lines 50-52: a rich exhaust mixture has a low oxygen concentration).

With regard to claims 21 and 24, Araki discloses essentially the same invention as the instant claims but fails expressly to disclose an oxygen sensor. However, Katoh et al discloses an arrangement comprising oxygen detecting means 16 generating a signal supplied to the control means 8. Araki discloses a temperature measuring means 18. Katoh et al also discloses a temperature measuring means 10, 10A and control means 8 for receiving the temperature signal and controlling charging or discharging of the gas absorption layer. At the time of the invention it would have been obvious to one skilled in the art to add an oxygen sensor to the apparatus of Araki. The motivation would have been to permit measurement of the air-fuel ratio in the exhaust (Araki claim 1).

With regard to claim 22, Araki discloses an absorption layer that releases at least one of NOx and SOx at an elevated temperature (Abstract).

With regard to claim 23, Araki discloses a temperature measuring means 18 and control means 20 for receiving the temperature signal and controlling charging or discharging of the gas absorption layer.

With regard to claims 27-28, Araki discloses an absorption layer including a precious metal (col. 2, line 44).

With regard to claim 29 Araki discloses an absorption layer including an oxidation catalyst (col. 2, lines 38-45; for example, Pt is an oxidation catalyst) containing the precious metal.

With regard to claims 31 and 32, Araki discloses essentially the same invention as that of the present claim but fails expressly to disclose a separate three-way oxidation catalyst. However, Katoh et al discloses a separate oxidation catalyst 6B exposed to the flow of gas. Three-way catalysts catalyze oxidation. At the time of the invention it would have been obvious to one skilled in the art to include the three-way catalyst of Katoh et al in the apparatus of Araki. The motivation would have been to enable removal of HC, NOx and CO from the gas stream.

7. Claims 12-14, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Araki et al (5,404,719) in view of Katoh et al (5,402,641) and Cornelison et al (5,240,682) as applied to claims 1, 3, 5-11, 15-29 and 31-32 above, and further in view of Neal et al. (4,755,499).

The same comments with respect to Neal et al apply.

Response to Arguments

8. Applicant's arguments filed 5/19/03 have been fully considered but they are not persuasive.

Applicant argues that Katoh et al does not disclose the active control of temperature using the electric heating. That may be so, however, the language of the claim does not require such electric heating (note the "at least one of" in instant claim 1). In any event, Cornelison discloses the use of metal substrate in the apparatus for removal of NOx in which the metal substrate is heatable by any electric heating means.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hien Tran whose telephone number is 308-4253. The examiner can normally be reached on Tuesday-Friday from 7:30AM-6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 308-6824. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-0661.

Hien Tran

HT
July 28, 2003

Hien Tran
Primary Examiner
Art Unit 1764